SERVICE MANUAL

Castle®

2420
Field Hospital Surgical Light

MDT Diagnostic Company
Castle Facility
1777 E. Henrietta Road
P.O. Box 23077
Rochester, New York 14692

Technology for Life

30840, Rev. C

SERVICE MANUAL 30840 (8/8/84)

Rev. A (2/20/85) **Text Revision, Add Disconnect**

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Rev. C (9/28/87) **Text/Graphics Revised: Commercial Pack & Mounting Plate with Integral Suspension Tube Assembly**

FOR COMPLETE MANUAL ADD:

Installation Instructions 30976
Operator's Manual 30839
Parts Catalog 30977

IMPORTANT

SPECIAL SAFETY SIGNS AND INSTRUCTIONS ARE USED IN THIS MANUAL. READ THEM CAREFULLY BEFORE USING THE LIGHT. IT IS THE RESPONSIBILITY OF THE USER TO FOLLOW ALL RECOMMENDATIONS.

"Warning" notes alert the user to the possibility of personal injury.

"Caution" notes alert the user to the possibility of damage to the equipment.

"Notes" alert the user to pertinent facts and conditions.

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2

TABLE OF CONTENTS

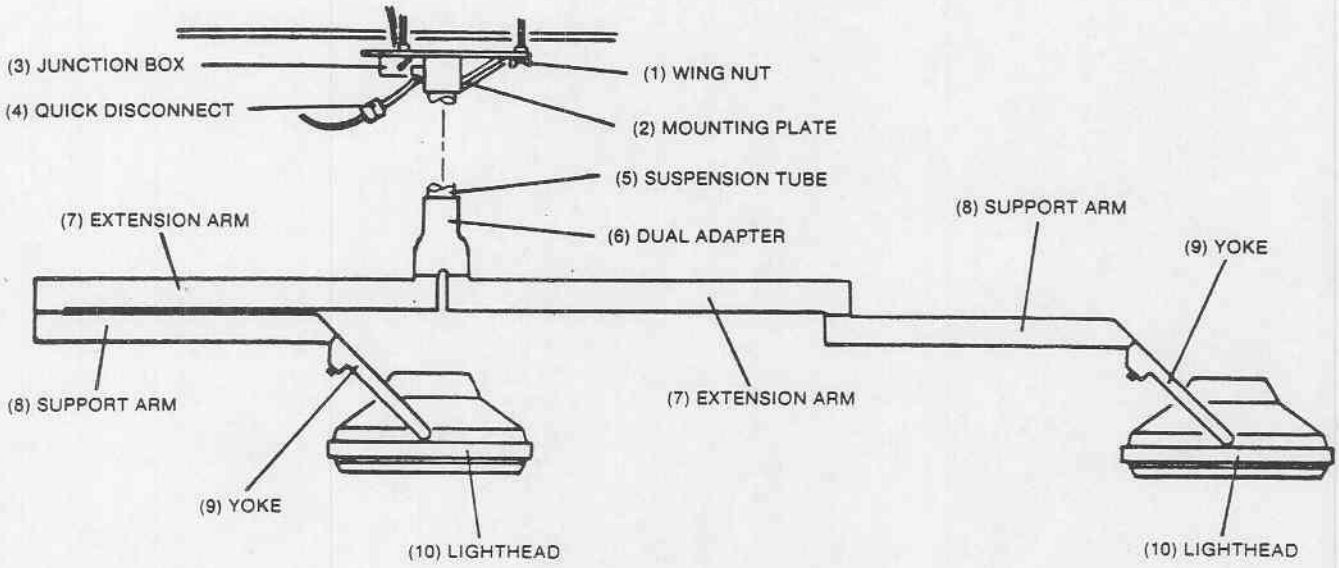
SECTION	PAGE
1. DESCRIPTION	
Light Model	1
2420 Surgical Light	2
Optical System	2
Pattern and Nominal Illumination	2
Intensity Control	2
Special Tools Required	2
2. SERVICE INSTALLATION CHECK	
2420 Mechanical Adjustments	4
Angular Lighthead Drift	4
Lighthead Rotational Drift	4
Support Arm Vertical Drift	5
Support Arm Horizontal Drift	5
Extension Arm Horizontal Drift	5
Light Performance Check	6
Optical Safety Check	6
Check ON/OFF Switch	6
Optical Performance Check	6
Intensity Control Check	6
3. WIRING DIAGRAM	
Field Hospital Ceiling Model Wiring Diagram	7
4. PREVENTIVE MAINTENANCE	
Cleaning Exterior Surfaces	9
Cleaning Interior Surfaces	9
Replacement Lamps	9
Replacing Lamps	9
Replacing Heat Filter	10
5. TROUBLE ANALYSIS	
Wiring Diagram	11
Trouble Analysis Guide - Electrical and Optical	11
Trouble Analysis Guide - Mechanical	12
6. REPAIR	
Removing Lighthead Cover	13
Replacing ON/OFF Switch	13
Removing Lighthead/Yoke Assembly	14
Replacing Lamp Contact	14
Replacing Reflector	15
Lamp Focus	16
120V Intensity Control	16
Removing Support Arm	17
Replacing Gas Spring	18
Wiring Extension/Support Arms	18
Removing Extension Arm	19
Installing Extension Arm	20
Mounting Plate/Support Tube	20
7. APPENDIX	
Appendix A: Salient Characteristics	21
Appendix B: List of Supplied Equipment	22
Appendix C: List of Required Equipment	22
Appendix D: Periodic Maintenance Adjustments and Procedures	23
Appendix E: Storage Instructions	24

LIST OF ILLUSTRATIONS

ILLUSTRATION		PAGE
—	Main Components and Functional Description	v
—	2420 Field Hospital and Surgical Light	1
Figure 1	- Intensity Control	2
Figure 2	- Rotational and Angular Movements	3
Figure 3	- Light Pivot Adjustment	4
Figure 4	- Yoke Pivot Adjustment	4
Figure 5	- Vertical Adjustment	5
Figure 6	- Support Arm Friction Adjustment	5
Figure 7	- Plumb Suspension Tube	5
Figure 8	- Extension Arm Frictional Adjustment	6
Figure 9	- Field Hospital Ceiling Model Wiring Diagram	7
Figure 10	- Lowering Lens Cover	9
Figure 11	- Replacement Lamp	9
Figure 12	- Removing Heat Filter	9
Figure 13	- Replacing Heat Filter	10
Figure 14	- Removing Lighthead Cover	13
Figure 15	- ON/OFF Switch Orientation	13
Figure 16	- Lighthead Connections	13
Figure 17	- Removing Lighthead/Yoke	14
Figure 18	- Lamp Contact Wiring	14
Figure 19	- Dislodging Retaining Ring	15
Figure 20	- Replacing Reflector	15
Figure 21	- Reflector Orientation	16
Figure 22	- Lamp Focus	16
Figure 23	- 120V Intensity Control	17
Figure 24	- Removing Support Arm	17
Figure 25	- Replacing Gas Cylinder	18
Figure 26	- Extension/Support Arm Wiring	19
Figure 27	- Removing Extension Arm	20

TABLES

TABLE	PAGE
Trouble Analysis Guide - Electrical and Optical	11
Trouble Analysis Guide - Mechanical	12



(1)	WING NUTS	-	Secure mounting plate to ceiling studs.
(2)	MOUNTING PLATE	-	Ceiling mount for light.
(3)	JUNCTION BOX	-	Power connection to light.
(4)	QUICK DISCONNECT	-	Field connection to light.
(5)	SUSPENSION TUBE	-	Provides single point suspension from ceiling.
(6)	DUAL ADAPTER	-	Mechanical connection for extension arms.
(7)	EXTENSION ARM	-	Provides horizontal rotation for lightheads.
(8)	SUPPORT ARM	-	Provides horizontal rotation and vertical adjustment for lightheads.
(9)	YOKE	-	Angular rotation for lightheads.
(10)	LIGHTHEAD	-	Light source enclosure.

MAIN COMPONENTS AND FUNCTIONAL DESCRIPTION

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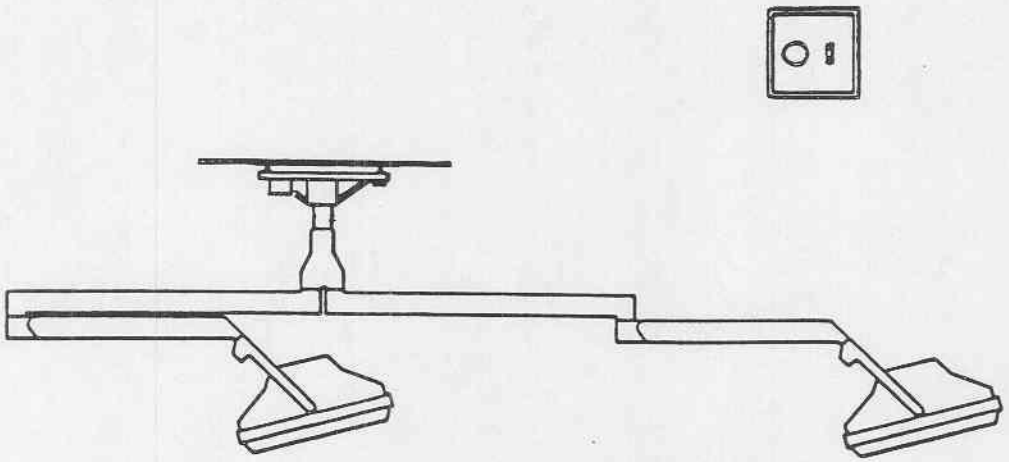
LIGHT MODEL



2420 Field Hospital Surgical Light

2420 SURGICAL LIGHT

The lighthead and arm assemblies are attached to extension arms which are suspended from the ceiling by means of a single suspension tube and mounting plate assembly. The suspension tube ends of the extension arms rotate 250°, the lighthead ends 290°. The intensity control interconnecting line is connected to the lighthead cable by a twist-lock connector on the mounting plate. Lighthead wire connections are located at the suspension tube pivot and the lighthead swivel.

OPTICAL SYSTEM

- Lamp - 150 Watt Quartz Halogen, Double Contact Bayonet Base, Castle Part No. 49455
- Blue-Green color correcting heat filter between lamp and reflector.
- Dichroic coated reflector to further color correct and cool the light beam.
- Frosted plastic lens for controlled diffusion.

PATTERN AND NOMINAL ILLUMINATION

Light measurements are made 36 inches below the outer edge of the frosted lens.

- 4000 footcandles nominal at 120V.
- 5-1/2 to 7 inch diameter light pattern.
- 26 to 60 inch depth of field.

INTENSITY CONTROL

This control for the ceiling model is remote and wall mounted, either surface or recessed. The customer provides an ON/OFF toggle switch. Rotating the control knob clockwise turns the circuit ON and increases the intensity from 0 to HIGH.

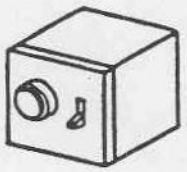


Figure 1. INTENSITY CONTROL

SPECIAL TOOLS REQUIRED

- Allen Wrenches
- External Retaining Ring Pliers

  Proto Pliers 385
  Tru-arc Pliers Model 1340
  Utica Pliers U8400 or equivalent

A - Lighthead Angular Drift
B - Lighthead Rotational Drift
C - Support Arm Vertical Drift
D - Support Arm Horizontal Drift
E - Extension Arm Horizontal Drift

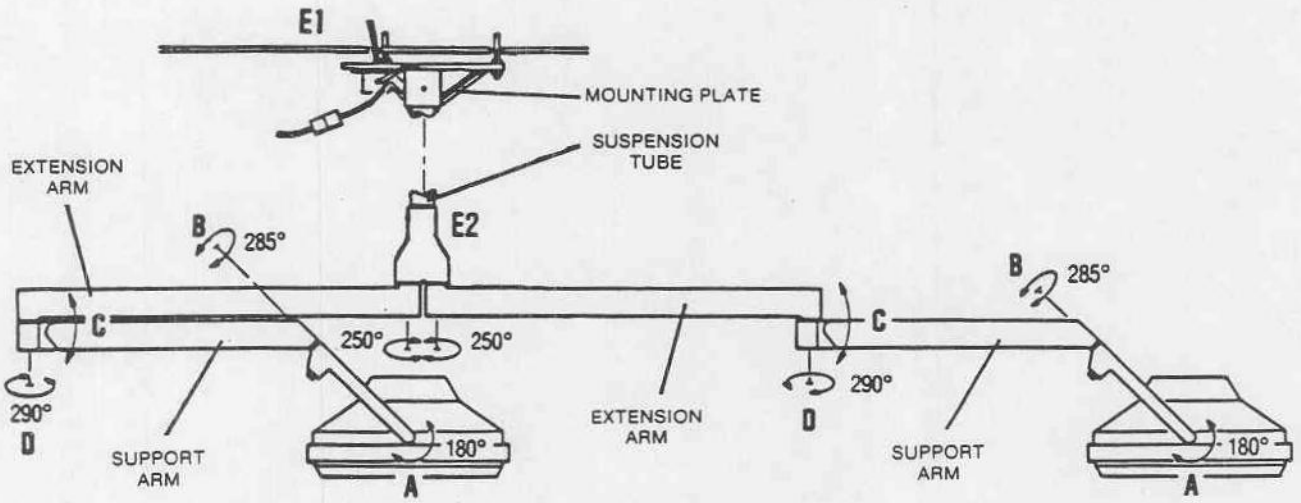


Figure 2. ROTATIONAL AND ANGULAR MOVEMENTS
Double Ceiling Model

NOTE

After installation is completed, service personnel should make mechanical adjustments, and electrical performance tests before the equipment is operated. These adjustments and tests are outlined in this Section.

2420 MECHANICAL ADJUSTMENTS

These instructions include all the adjustments provided to correct drift in the 2420 Light. Refer to Figure 2 for light components, location of the individual adjustments, and angular limitations.

Detailed instructions for removing and replacing some covers, such as the lighthead cover, are located in the Repair Section.

Each movement is divided into *check* and *adjustment* steps. Always do the *check* first. If the particular movement does not meet the requirements of the *check*, then proceed with the *adjustment* steps.

NOTE

Adjustments A thru C should not be required on newly installed equipment. Make the adjustment only if there is a definite rotation drift. There should be free movement of the arm but no drift.

Angular Lighthead Drift - Figure 3

Adjustment A

Correct lighthead drift in the angular plane by increasing tension on the yoke pivot spring washer.

Check

1. Rotate the lighthead up and down about its axis.
2. Lighthead movement should stop when the integral handle is released at any point in the vertical travel.

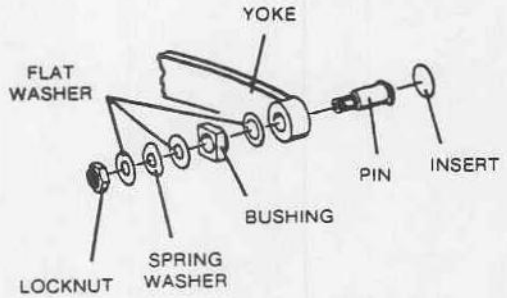


Figure 3. LIGHT PIVOT ADJUSTMENT

Adjustment

3. Remove the lighthead cover.

   Adjustment is made on the right hand pivot.
4. Tighten locknut until angular drift is just eliminated.
5. Again check for angular drift.
6. Replace cover.

Lighthead Rotational Drift - Figure 4
Adjustment B

WARNING

Disconnect or turn OFF power source to the light before any maintenance to avoid hazardous electrical contact. Allow a 15 minute cool-off period to avoid touching hot lighthead parts.

Correct lighthead drift in the rotational plane by increasing tension on the yoke mounting spring washer.

Check

1. Rotate lighthead around the axis of the support arm.
2. Lighthead movement should stop when the integral handle is released at any point in the yoke rotation.

Adjustment

1. Remove the lighthead switch cover.
2. Break loctite and loosen lighthead set screw.

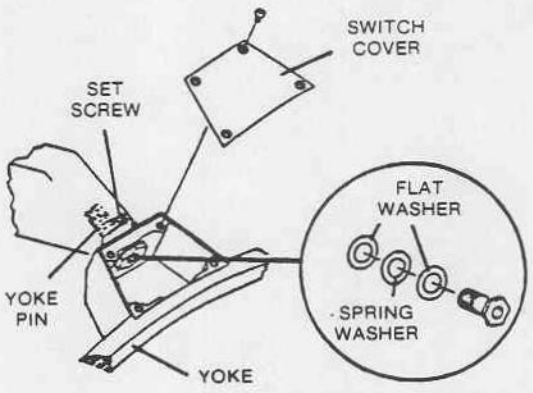


Figure 4. YOKE PIVOT ADJUSTMENT

3. Break loctite and back off yoke pin about 1/8 inch using an open end wrench.
4. Tighten yoke pin until rotational drift is eliminated.
5. Apply loctite and tighten lighthead set screw.
6. Check again for rotational drift.
7. Replace switch cover.

Support Arm Vertical Drift - Figure 5

Adjustment C

Correct lighthead drift in the vertical plane by increasing tension on the support pivot spring washers.

Check

1. Move the support arm up and down using the integral handles.
2. Lighthead movement should stop when the handle is released at any point in vertical travel.

Adjustment

3. Tighten friction adjustment screws equally until vertical drift is eliminated.

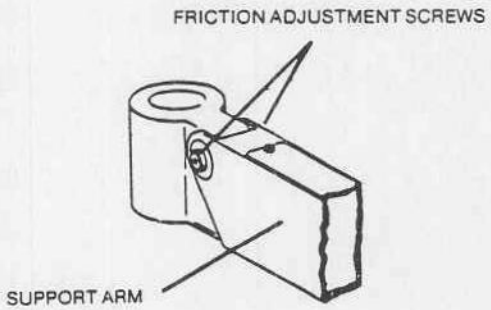


Figure 5. VERTICAL ADJUSTMENT

Support Arm Horizontal Drift - Figure 6

Adjustment D

Correct support arm drift in the horizontal plane by increasing friction on the bearing post.

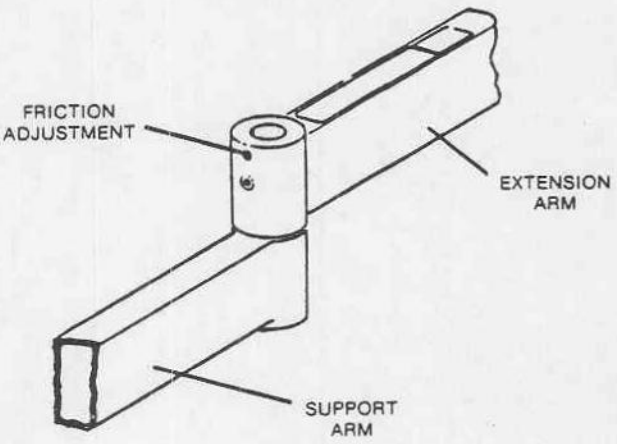


Figure 6.
SUPPORT ARM FRICTION ADJUSTMENT

Check

1. Check Adjustment E before making this adjustment.
2. Rotate the support arm about the extension arm.
3. Check for drift at several locations through 290°.

Adjustment

4. Tighten friction adjustment set screw until horizontal drift is eliminated at all locations through 290° travel.

Extension Arm Horizontal Drift - Figures 7 & 8

Adjustments E1 and E2

NOTE ▶ *Double lighthead models have both extension arm pivots at a yoke which in turn is connected to a single suspension tube. Adjustments for each extension arm are the same as for a single lighthead model.*

Correct extension arm drift in the horizontal plane by plumbing the suspension arm and adjusting the tripod (**E1**) and by increasing on the bearing post (**E2**).

Check

1. Rotate the extension arm about the suspension tube.
2. Check for drift at several locations through 250°.
3. If the extension arm usually drifts to the same location of the 250° travel, make adjustments E1 and E2.
4. If the extension arm drifts in either direction at any location, proceed to adjustment E2.

Adjustment E1

5. Plumb the suspension tube by adjustment of the mounting plate wing nuts.

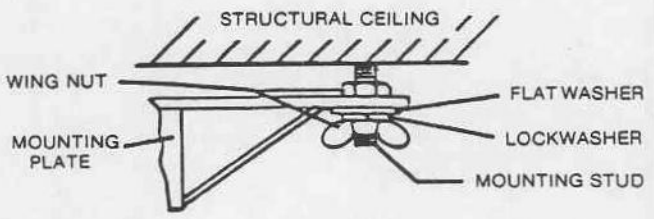


Figure 7. PLUMB SUSPENSION TUBE

6. Raise mounting plate ring in direction extension arm drifts toward. Lower opposite side of ring if necessary.
7. Check again for E1 type drift.
8. Tighten all leveling nuts.

Adjustment E2

9. Tighten friction adjustment set screw until horizontal drift is eliminated at all locations of travel.

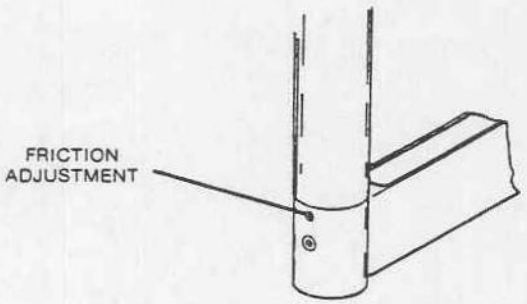


Figure 8.
EXTENSION ARM FRICTION ADJUSTMENT

LIGHT PERFORMANCE CHECK

Performance checks are required to insure correct and safe operation of the light. These checks and any necessary adjustments should be done by Castle Division Service personnel. Refer to the Repair Section of this manual for any service corrections.

Optical Safety Check

1. Remove lens cover.
2. Ensure that shipping material has been removed from around blue-green heat filter.
3. Check that heat filter is in place and that three spring wires are in place.
4. Replace lens cover.

Check ON/OFF Switch

Check

Move lighthead through maximum travel at both pivots using integral handles. Observe that the light does not flicker or go out. Check for positive action of the switch.

Service Correction

1. Ensure that all lighthead wires are firmly attached to flat terminals and that terminals are secure.
2. Replace ON/OFF switch if required.

Optical Performance Check

The light should have a 5-1/2 to 7 inch diameter light pattern at 36 inches below the outer edge of the lens cover. The illumination should be 3000 to 5500 footcandles at 120V, measured at the center of the pattern.

Intensity Control Check

1. Turn intensity control to a middle position.
2. Snap intensity control toggle switch to ON.
3. Snap lighthead switch to ON. The lamp should light.
4. Rotate intensity control counterclockwise. The light should dim.
5. Rotate the intensity control clockwise through its maximum travel. Light intensity should vary smoothly without falter or rough spots.

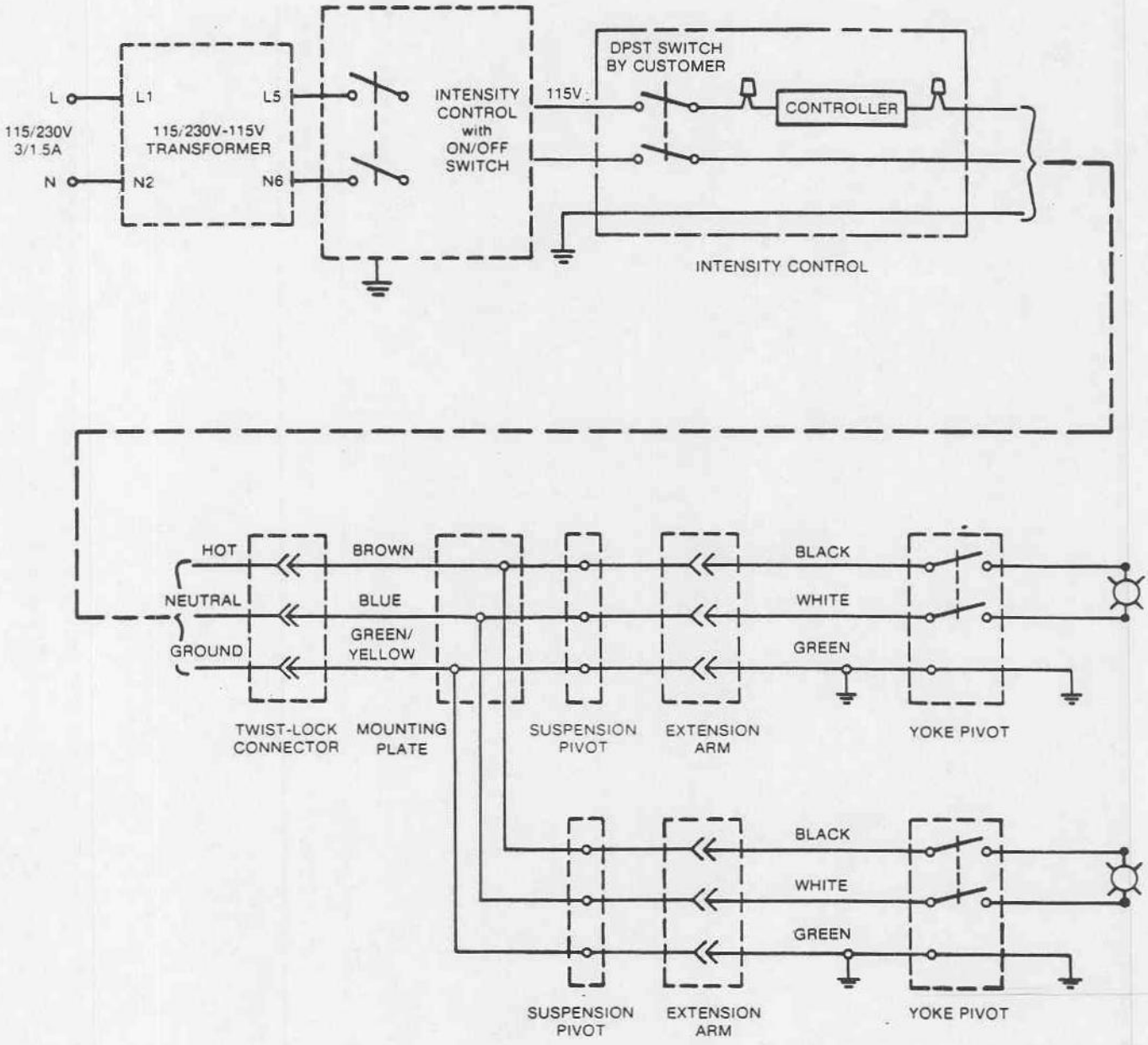
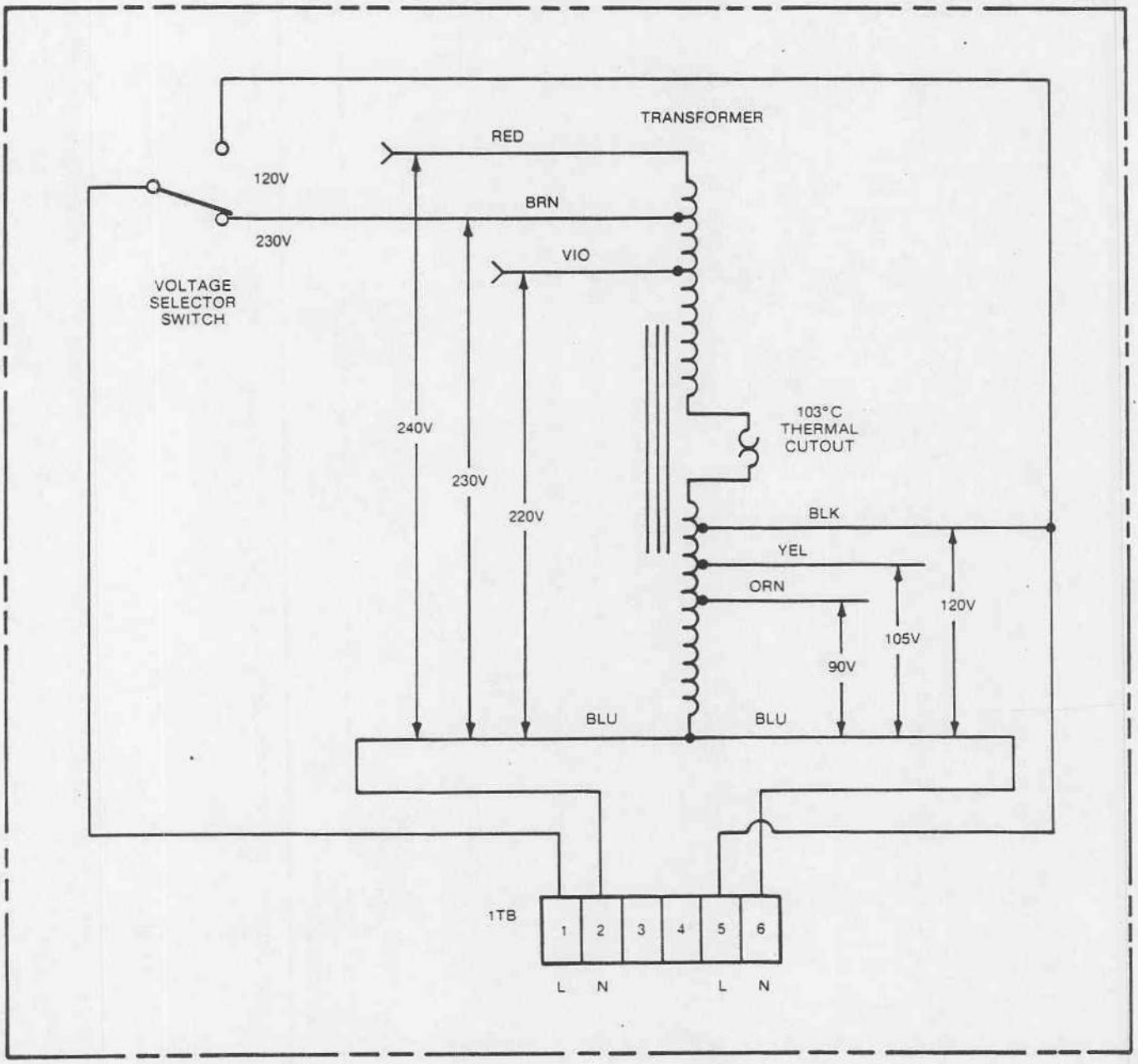


Figure 9. FIELD HOSPITAL CEILING MODEL WIRING DIAGRAM



TRANSFORMER WIRING SCHEMATIC

WARNING

Disconnect or turn OFF power source to the light before any maintenance to avoid hazardous electrical contact. Allow a 15 minute cool-off period to avoid touching hot lighthead parts.

CLEANING EXTERIOR SURFACES

Use mild cleaning agents that will not damage painted, plated or plastic surfaces.

CLEANING INTERIOR SURFACES

CAUTION

The lens cover, blue-green heat filter and dichroic reflector should be handled with extreme care to avoid damage to their optical surfaces.

1. Loosen thumbscrews and lower the lens cover. The cover will be suspended by a retaining strap.

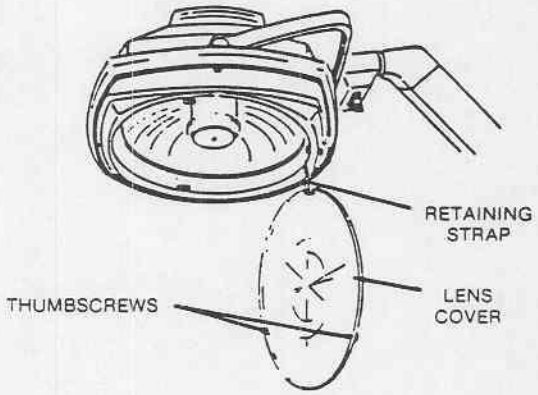


Figure 10. LOWERING LENS COVER

2. Gently clean the inside of the reflector with cotton dampened with distilled or deionized water. The cotton will conform to the contour of the reflector. Clean in direction of flutes. Wipe dry with a fresh piece of cotton.

CAUTION

Do not use acid solutions, including chlorinated cleaners. Do not use any scrubbing or abrasive action to avoid damage to the reflector.

The water should be deionized or distilled.

3. Clean the outside of the blue-green heat filter in the same manner.
4. Gently clean both surfaces of the lens cover with cotton dampened with distilled or deionized water, wipe dry with fresh cotton.
5. Replace the lens cover.

WARNING

The blue-green heat filter and lens cover must be in place to prevent ultraviolet and infrared rays from reaching the patient or operator.

REPLACEMENT LAMPS

150 Watt, Quartz Halogen, Double Contact Bayonet Base, Castle Part No. 49455

Figure 11. REPLACEMENT LAMP

REPLACING LAMPS

WARNING

Disconnect or turn OFF power source to the light or intensity control before any maintenance to avoid hazardous electrical contact. Allow a 15 minute cool-off period to avoid touching hot lighthead parts.

1. Disconnect or turn OFF power source.
2. Loosen lens cover thumbscrews. The lens cover will hang from a retaining strap.
3. Rotate the lighthead to face the operator at a little above eye level.

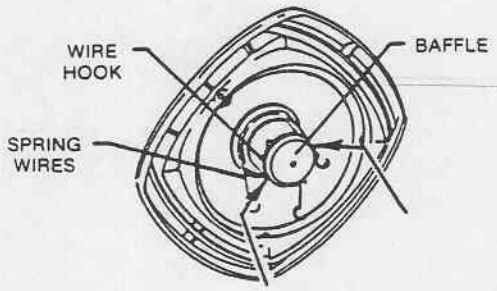


Figure 12. REMOVING HEAT FILTER

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4. Hold the baffle firmly and unhook the three spring wires.
5. Remove the heat filter/baffle assembly. Avoid touching the blue-green glass.
6. Press down and turn the lamp counterclockwise to remove.

CAUTION

Read handling note printed on wrapper of new lamp.

Skin oils will damage and shorten life of the lamp. If accidentally touched, wipe lamp with alcohol or distilled water.

7. Hold new lamp by wrapper and insert in socket. Press down and turn clockwise to insert.
8. Clean both surfaces of the blue-green heat filter with cotton dampened with deionized or distilled water.
9. Replace filter/baffle assembly in upper recessed area. Attach spring wires and lens cover.

WARNING

The blue-green heat filter and lens cover must be in place to prevent ultraviolet and infrared rays from reaching the patient or operator.

REPLACING HEAT FILTER

WARNING

Disconnect or turn OFF power source to the light or intensity control before any maintenance to avoid hazardous electrical contact. Allow a 15 minute cool-off period to avoid touching hot lighthead parts.

1. Disconnect or turn OFF power source.
2. Remove lens cover and unhook the three heat filter spring wires.
3. Remove the filter/baffle assembly for bench work.
4. Remove the filter clips and replace filter.

NOTE

The heat filter is cone shaped. The larger diameter positions into the baffle assembly.

5. Replace the filter clips. Tighten screws until clips are snug. Do not overtighten.

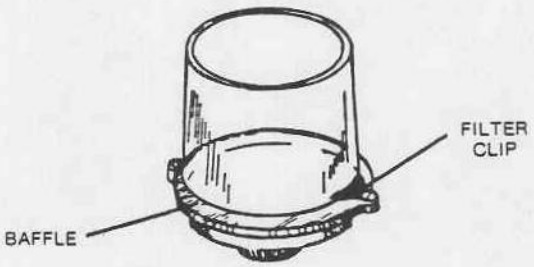


Figure 13. REPLACING HEAT FILTER

6. Clean both surfaces of the heat filter with cotton dampened with distilled or deionized water.
7. Replace heat filter assembly, spring wires and lens cover.

NOTE

Ensure that the heat filter is positioned in the upper recessed area.

WARNING

The blue-green heat filter and the lens cover must be in place to prevent unfiltered rays from reaching the operator or patient.

WIRING DIAGRAM

The Wiring Diagram is located in Section 3 of this manual. Use this diagram in conjunction with the Trouble Analysis Guides.

Several of these checks are made with the power ON. Only trained service personnel should make these tests.

TROUBLE ANALYSIS GUIDE - ELECTRICAL AND OPTICAL

TROUBLE	PROBABLE CAUSE	REMEDY
ON/OFF Switch ON, Light out.	No power to light.	Check power cord or power source.
	Lamp out.	Replace lamp.
	Defective wiring.	Check wiring at: 1. Lighthead. 2. Lighthead connection box. 3. Extension arm connection or support post disconnect. 4. Mounting plate junction box. Correct defective wiring.
	Defective transformer.	1. Check transformer connections. 2. Replace transformer.
Low Light Intensity.	Dirty lens or reflectors.	Clean or replace. Refer to Section 4 for suggested procedure.
	Damaged reflectors or lens.	Replace defective part.
	Lamp defective.	Replace lamp.
	Power input low.	Check for full 120V or 220V supply.
Intermittant illumination when pivoting arms.	Loose wire connections, frayed or broken wires.	Check wiring for continuity.
	Defective lamp.	Replace lamp.
Irregular intensity increase to light equipped with optional intensity control.	Defective intensity controller.	Repair or replace.
	Defective interconnecting wiring.	Check each line for continuity between intensity control and mounting plate junction box.

TROUBLE ANALYSIS GUIDE - MECHANICAL

TROUBLE	PROBABLE CAUSE	REMEDY
Lighthead drifts in angular plane.	Yoke pivot out of adjustment.	Adjust tension on yoke pivot spring washer. Adjustment A.
Lighthead drifts in rotational plane.	Yoke mounting pivot out of adjustment.	Adjust tension on yoke mounting spring washer. Adjustment B.
Vertical drift in support arm.	Support arm pivot out of adjustment.	Adjust tension on support arm washers. Adjustment C.
Horizontal drift in support arm.	Support arm friction plug loose on bearing post.	Adjust friction on support arm bearing post. Adjustment D.
Horizontal drift in extension arm.	Suspension tube not plumb.	Adjust mounting plate leveling nuts. Adjustment E1.
	Extension arm friction plug loose on bearing post.	Adjust friction on extension arm bearing post. Adjustment E2.

WARNINGS

Disconnect or turn OFF power source to the light before any maintenance or service work to avoid hazardous electrical contact. Allow a 15 minute cool-off period to avoid touching hot lighthead parts.

On ceiling models, power must be turned OFF to the intensity control.

After any service work, the blue-green heat filter and the lens cover must be re-installed in place to prevent ultraviolet and infrared rays from reaching the patient or operator.

REMOVING LIGHTHEAD COVER

Loosen four screws and remove the lighthead cover from the lighthead housing. To replace cover, rotate housing away from yoke.

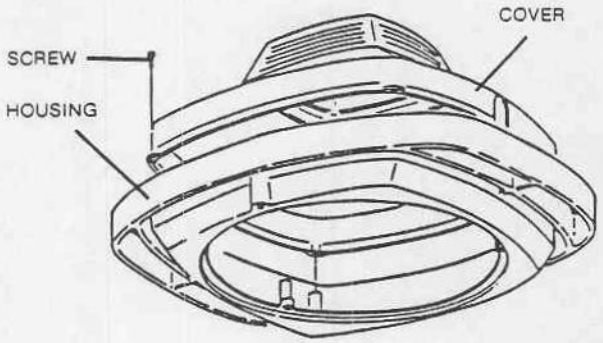


Figure 14. REMOVING LIGHTHEAD COVER

REPLACING ON/OFF SWITCH

1. Observe the switch orientation. OFF is toward the left on the nameplate.
2. Remove switch cover. Disconnect and prevent ends of blue and brown wires from retracting into the arm or yoke.

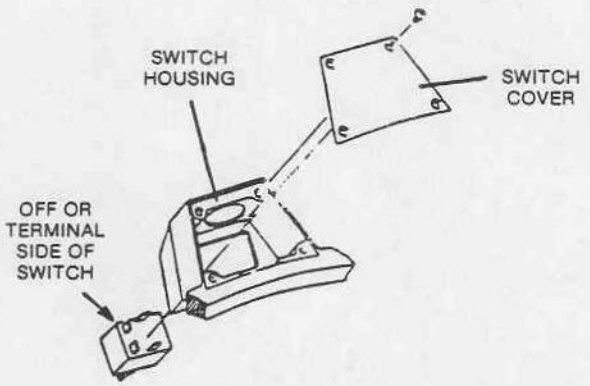
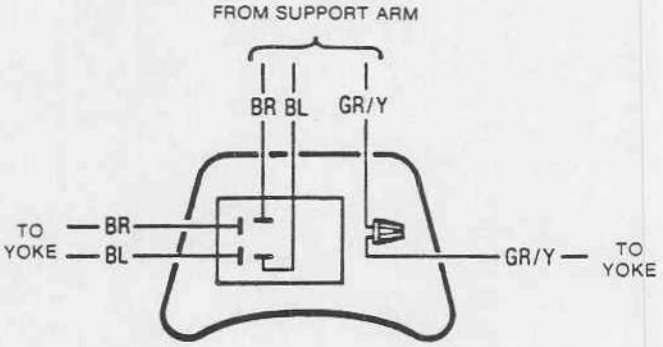


Figure 15. ON/OFF SWITCH ORIENTATION



NOTE: WIRE COLORS ARE BLACK AND WHITE ON SOME LIGHTS.

Figure 16. LIGHTHEAD CONNECTIONS

3. Press down on terminal surface of switch to remove from housing.
4. Install new switch in housing with terminals and OFF indication toward left.
5. Rewire switch and check for correct operation.
6. Replace switch cover.

REMOVING LIGHTHEAD/YOKE ASSEMBLY

CAUTION

Disconnect or turn OFF power to the light or intensity control to avoid hazardous electrical contact.

1. Remove the lighthead switch cover.

WARNING

Secure wires from lighthead and from support arm to avoid wire ends slipping into castings.

2. Disconnect ground line wire nut.
3. Disconnect hot and neutral wires from ON/OFF switch.
4. Break loctite and loosen lighthead setscrew.

CAUTION

The support arm will spring upward when lighthead is removed. Secure arm to prevent pivot movement.

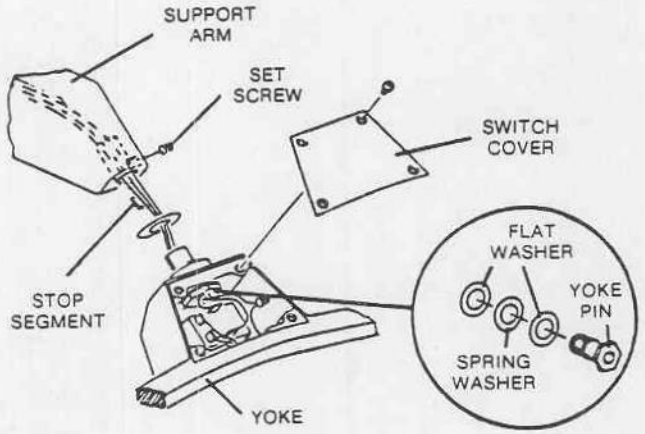


Figure 17. REMOVING LIGHTHEAD/YOKE

5. Remove yoke pin and stop segment. Separate lighthead from support arm.
6. Cut flag terminals from yoke wires.

CAUTION

Stop segment must be in place to prevent over rotation of yoke and lighthead.

7. Replace lighthead in reverse order of removal. Refer to Figure 17 for placement of spring washer. Apply Loctite #222 and tighten yoke pin until rotational drift is eliminated.
8. Refer to Adjustment B in Section 2 to correct any lighthead rotational drift.
9. Crimp on new flat terminals to support arm wires (Part No. 65199). Connect line (black) and neutral (white) wires to ON/OFF Switch. Refer to Figure 16.
10. Connect hot and neutral wires (blue and brown) to ON/OFF switch. Refer to Figure 16.
11. Connect ground wires. Wrap wire nut with tape.
12. Check lighthead for correct operation and rotation.

REPLACING LAMP CONTACT

WARNING

Disconnect or turn OFF power to the light or intensity control to avoid hazardous electrical contact.

Use Repair Package 67501 for this Procedure. Package consists of the contact with wiring, retaining ring, two flag terminals and sleeving.

1. Remove lens, heat filter, back cover and switch plate.
2. Disconnect ground wire from heat dissipation plate.
3. Remove cable clamp from heat dissipation plate.
4. Disconnect lighthead wires from ON/OFF toggle switch. Cut flag terminals from wires.
5. Lift gasket from yoke to expose contact wires. Lift wires from yoke.
6. Remove three plate mounting screws and guide heat plate along the sleeve. Do not move or adjust focus screws at this time.

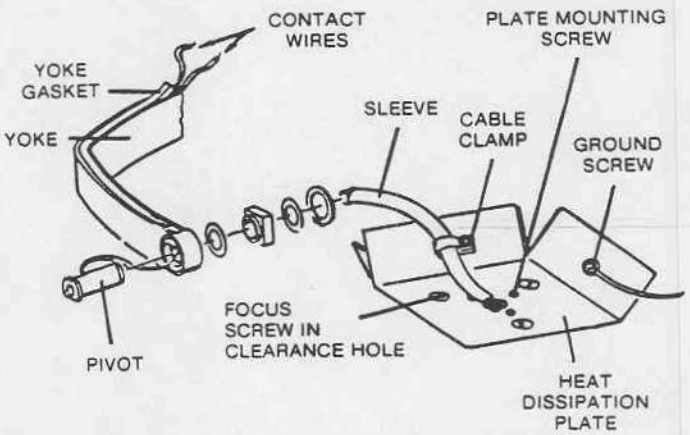


Figure 18. LAMP CONTACT WIRING

7. Insert a small screwdriver blade between the external teeth of the contact retaining ring to pry it loose from the finned heat sink. The retaining ring will be destroyed.
8. Attach a fish wire to the cut ends of the contact wires and tape. Pull old wires through pivot and sleeve.

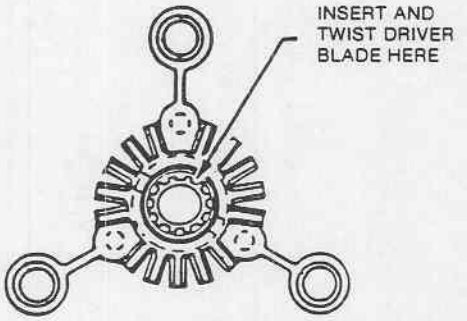


Figure 19. DISLODGING RETAINING RING

NOTE

Correct lamp contact orientation must be observed. There are four internal slots in the finned heat sink. Use only the narrow slots for the lamp contact.

9. Install new contact into finned heat sink casting. Guide socket lugs into *narrow* slots, 90° apart.
10. Thread leads thru new retaining ring and spring.
11. Use a screwdriver blade to install new retaining ring. *Ring must be seated* against bottom of casting.
    - *Check* spring tension on lamp contact.
    - *Check* lamp fit and orientation of contacts before reassembling.
12. Guide new contact wires thru sleeve and pivot.

CAUTION

Check that wire insulation is not frayed or torn.

13. Align wires along yoke gasket groove and into switch cavity. Lay wires into groove one at a time.
14. Form gasket into groove to the correct length.
15. Refer to Figure 16. Crimp new flag terminals onto wires and connect to ON/OFF switch.

CAUTION

The hot and neutral wires must be contained in the sleeve and the sleeve in place to maintain integrity of codes and regulatory commission mandates.

16. Reconnect ground wire securely. Reassemble cable clamp. Replace heat plate and lamp.
17. Turn ON power and check operation of light and switch.
18. Turn OFF power to light.
19. Replace all lighthead parts in reverse order.

REPLACING REFLECTOR

WARNING

Disconnect or turn OFF power source to the light before any maintenance to avoid hazardous electrical contact. Allow a 15 minute cool-off period to avoid touching hot lighthead parts.

1. Remove lens, lighthead cover and heat sink. Refer to this Section for these procedures.
2. Remove ground wire from heat plate.
3. Remove four screws, nuts and washers to lift reflector heat sink assembly from the reflector.

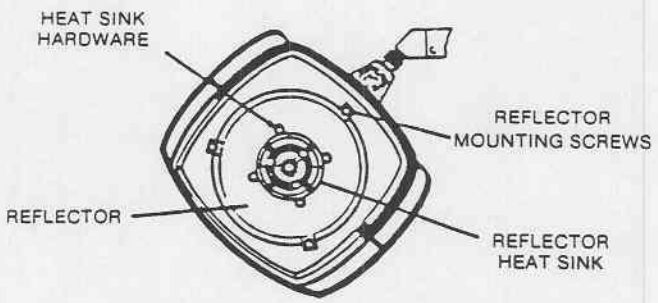


Figure 20. REPLACING REFLECTOR

4. Remove three screws and lift old reflector from housing.
5. Install new reflector and reassemble lighthead in reverse order of disassembly. Refer to Figure 21 for orientation of components.

(Continued)

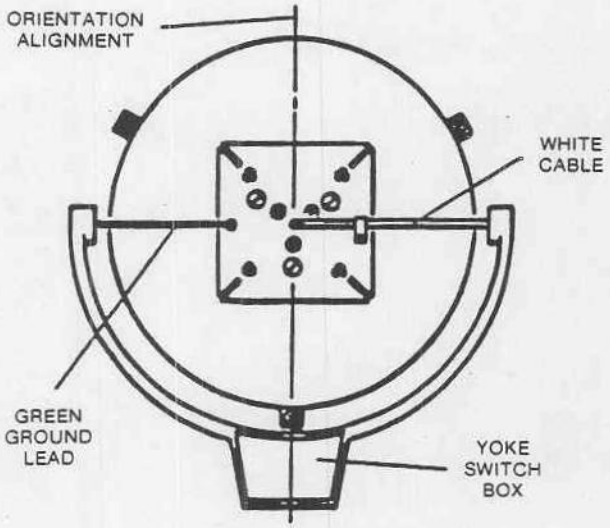


Figure 21. REFLECTOR ORIENTATION

LAMP FOCUS

Lamp focus is factory set, but can be adjusted if required. Position lighthead 36" from and parallel to the illuminated surface. Adjust focus screws to achieve maximum illumination consistent with a uniform, round pattern.

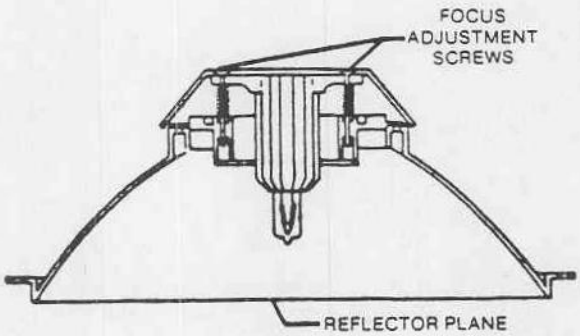


Figure 22. LAMP FOCUS (New Reflector)

120V INTENSITY CONTROL

Disconnect or turn OFF power to the light or Intensity Control to avoid hazardous electrical contact.

If the light does not respond when the Intensity Control is operated, check the lighting system in the following sequence:

1. Check that the lighthead ON/OFF switch is ON.
2. Check that the electrical supply circuit to the Intensity Control is energized.
3. Check with a 120V test light or AC voltmeter for proper voltage through the toggle switch and the dimmer control.
4. Rotate the control shaft to the extreme positions. A continuous smooth intensity response should be obtained.
5. Replace the toggle switch or the dimmer control if they malfunction.
6. If replaced, assemble the toggle switch to the right side of the outlet box with the switch spacers.
7. To assemble a new controller:
   - Break off two fins on the right side taking care not to crack plastic switch housing.
   - File top and bottom corners on the left side.
   - Assemble controller to the outlet box with spacers.
8. Position the cover with the vent holes over the controller.
9. Assemble shaft to knob with two setscrews. Push knob and adapter onto controller shaft.

(Continued)

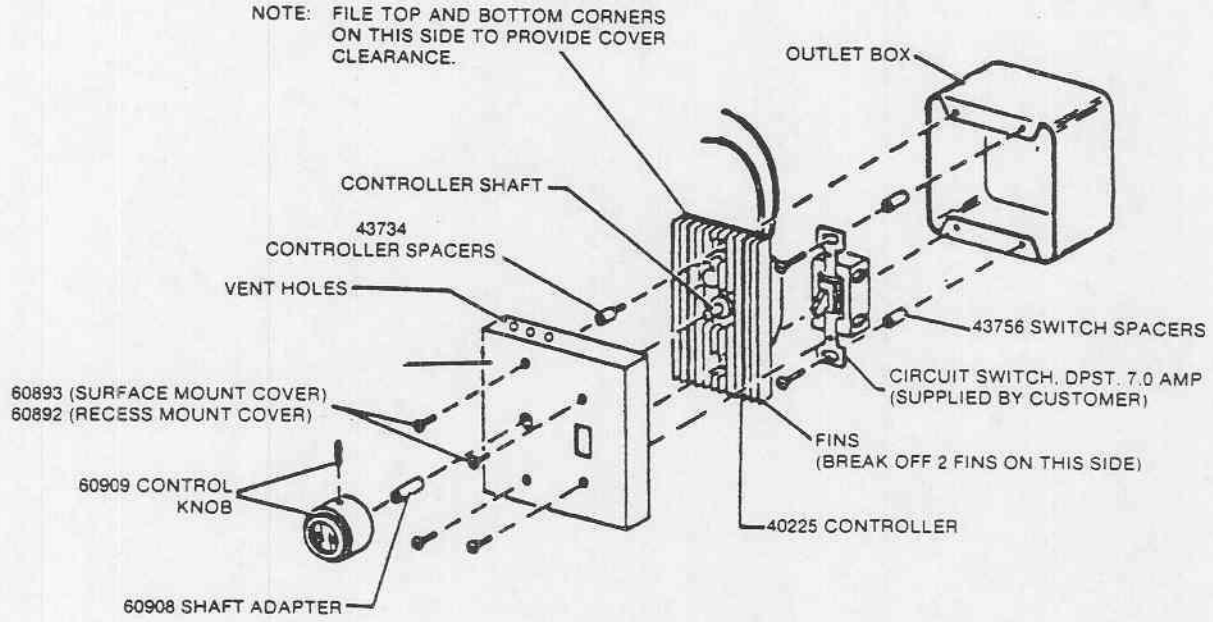

NOTE: FILE TOP AND BOTTOM CORNERS ON THIS SIDE TO PROVIDE COVER CLEARANCE.
OUTLET BOX
CONTROLLER SHAFT
43734 CONTROLLER SPACERS
VENT HOLES
43756 SWITCH SPACERS
CIRCUIT SWITCH, DPST, 7.0 AMP (SUPPLIED BY CUSTOMER)
60893 (SURFACE MOUNT COVER)
60892 (RECESS MOUNT COVER)
FINS (BREAK OFF 2 FINS ON THIS SIDE)
60909 CONTROL KNOB
40225 CONTROLLER
60908 SHAFT ADAPTER

Figure 23. 120V INTENSITY CONTROL

REMOVING SUPPORT ARM

Disconnect or turn OFF power source to the light or Intensity Control to avoid hazardous electrical contact.

1. Remove the stopscrew and back off friction plug setsetscrew.
2. Refer to Figure 26. Disconnect and remove wiring from extension arm.
3. Remove the bearing post retaining ring to lower the support arm from the extension arm.
4. Wipe bearing post clean and apply a thin coat of grease.
5. Reassemble the arms in reverse order of disassembly.
6. Use retaining ring pliers to insert the retaining ring into the groove in the bearing post.
7. Use a screwdriver blade to insure that the retaining ring is seated and secure in the post groove.

A loose or unseated retaining ring could cause the stopscrew to loosen and allow the support arm to disengage.

8. Refer to Adjustment D in Section 2 to correct any Support Arm Horizontal Drift.

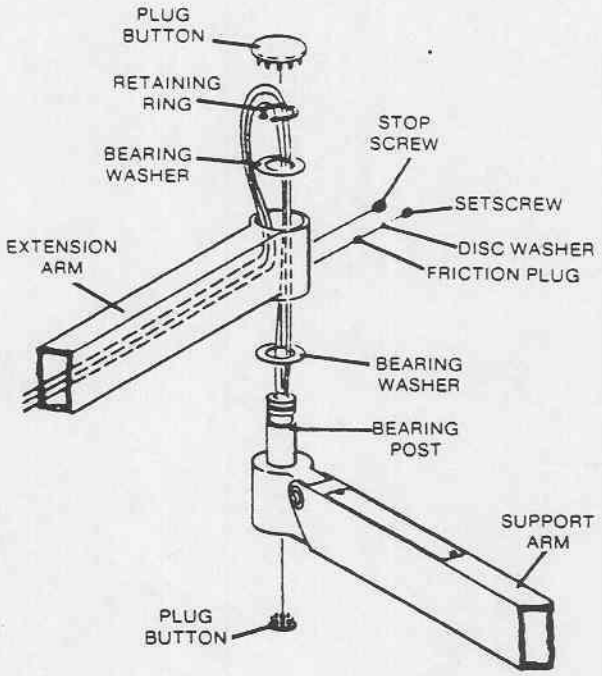


Figure 24. REMOVING SUPPORT ARM

23

REPLACING GAS SPRING

WARNING

Disconnect or turn OFF power to the light or Intensity Control to avoid hazardous electrical contact.

1. Secure the lighthead and support arm in the *up* position.
2. Remove the upper and lower access covers.
3. Remove the C-Washer from the cylinder mounting pin.
4. Gently joggle the support arm upward to remove the mounting pin. The end of the gas spring will move into the upper recess area.
5. Snug the electrical wires to the side of and under the gas spring.
6. Guide the gas spring through the upper access opening as the support arm is slowly lowered.
7. Note that one end of the groove pin is smaller. Drive groove pin out from the smaller end.
8. Lift the old gas spring out of the arm.

NOTE

If the old spring is equipped with a low limit stop normally used on ceiling models, follow Steps 9, 10 and 11.

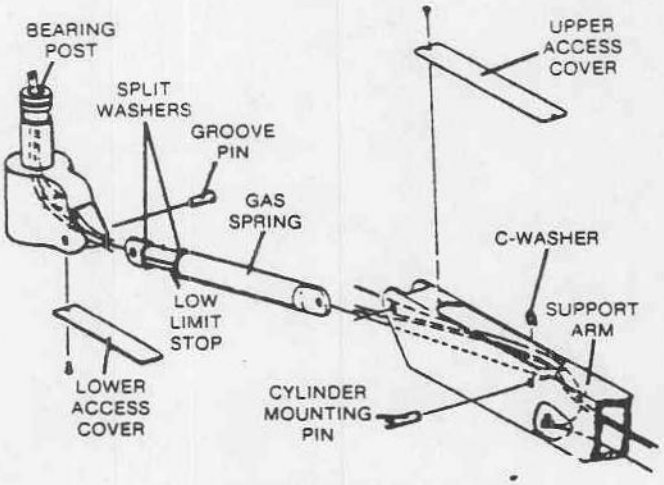


Figure 25. REPLACING GAS CYLINDER.

9. Cut and remove the black electrical tape wrapped around the stop halves.
10. Remove and install the split washers on the new spring. Crimp split ends.
11. Install the stop halves on the new spring with their edges 90° to the gas spring blade. Bind the stop halves with tape.
12. Place the new spring into the arm with the rod or stop end toward the bearing post and with the end lugs vertical.
13. Guide the groove pin through the arm and the spring with the electrical wires over the pin. Rotate the flutes on the groove pin to form new grooves in the housing. Drive the pin flush with the surface of the housing.

CAUTION

The three electrical wires: line, neutral and ground, must be routed above the groove pin, gas spring, and the spring mounting pin. This will prevent the motion of the spring from cutting the wires.

14. Raise the lighthead until the spring mounting shoulder pin can be installed. Install the pin below the three electrical wires. Add C-Washer to retain pin.
15. Replace the upper and lower access covers.
16. Refer to Adjustment C in Section 2 to correct any Support Arm Vertical Drift.

WIRING EXTENSION/SUPPORT ARMS

Use 50 inch lengths of wires. Use #18 AWG for black and white wires, and #16 AWG for green wire.

1. Remove extension arm for benchwork. Refer to that procedure in this manual.
2. Remove gas spring from the support arm. Refer to "Replacing Gas Spring," Steps 1 thru 8, in this manual.
3. Disconnect ground wires in the support arm.
4. Remove ON/OFF switch plate and all plug buttons.
5. Disconnect flag terminals on black and white wires from support arm. Cut off terminals. Remove wire nut from green ground wires.
6. Attach a fish wire to all three support arm wires in the switch compartment. Pull old wires and fish wires out the upper access area. Secure fish wire and cut wires from it. Remove and save fiberglass tubing.

7. Cut ring terminal off green ground wires.
8. Attach a separate fish wire to each wire. Guide and pull each wire out of Hub A. Secure each fish wire and cut wires from them.

Install new wires and fiberglass tubing as follows:

1. Install short piece of fiberglass tubing over the three replacement wires. Tape tubing in place with four inches of each wire protruding.
2. Attach wires at the tubing end to the single fish wire coming from the ON/OFF switch compartment, at the upper access area. Pull and guide the fish wire and wires until taped end of fiberglass tubing becomes visible in the ON/OFF compartment.
3. Cut the three new wires 2-1/2 inches beyond their entrance into the ON/OFF switch compartment.
4. Strip black and white wires and crimp a flag terminal on each (Part No. 65199). Connect to ON/OFF switch. Refer to Figure 6-3.
5. Strip green ground wire. Secure to mating wire from lighthead yoke with wire nut and tape.
6. Cut the green wire at a point so that it protrudes 1-1/2 inches from the upper access area. Strip both ends of the duct wire and crimp with ground ring terminals (Part No. B0167).
7. Secure ring terminals to support arm ground connection with hex nut.
8. At the upper access area, attach a fish wire to each wire. Pull and guide each wire from the upper access area to Hub A. Remove each fish wire.
9. Install long piece of fiberglass tubing over the three replacement wires. Push tubing over wires and into Hub A approximately two inches. Tape other end of wires to secure tubing.
10. Attach the fish wire at Hub A to the three wires. Pull and guide wires to Hub B.
11. Cut and strip the three wires so they protrude two inches up from Hub B.
12. Replace gas spring per instructions in this manual, Steps 12 thru 16.
13. Install extension arm per instructions in this manual.
14. Replace ON/OFF switch cover plate and all plug buttons.

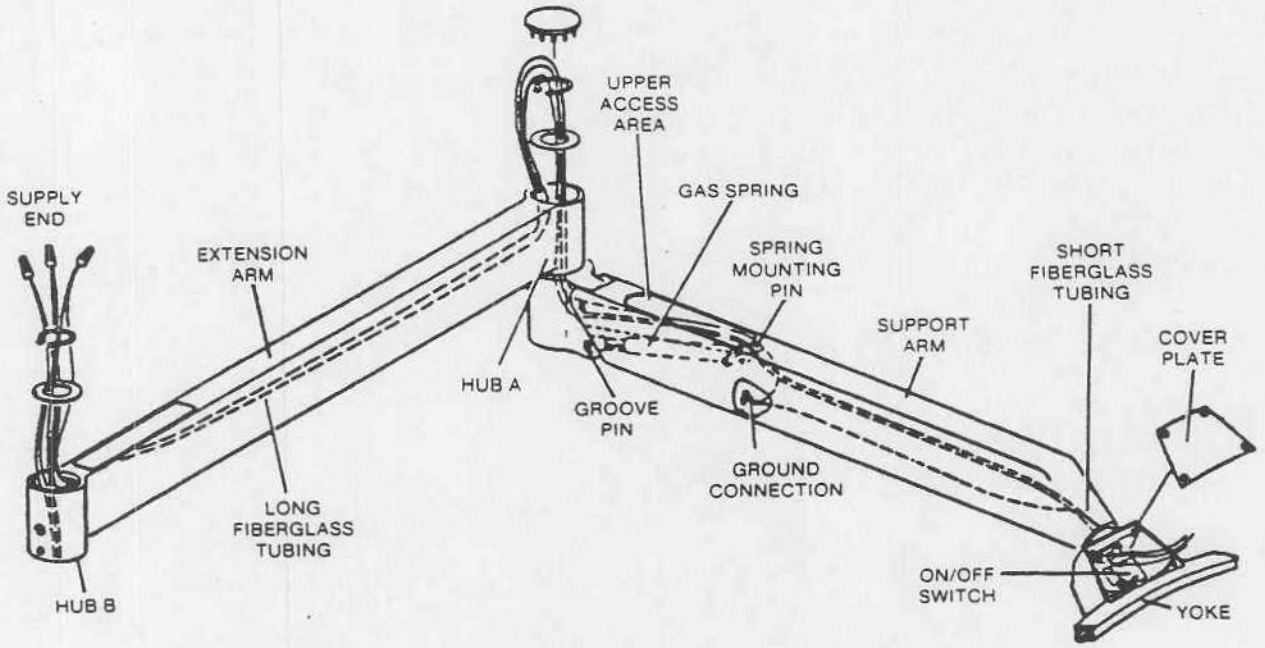


Figure 26. EXTENSION/SUPPORT ARM WIRING

REMOVING EXTENSION ARM

Disconnect or turn OFF power to the light or Intensity Control to avoid hazardous electrical contact.

1. Remove plug button.
2. Disconnect wire nuts.
3. Loosen stopscrew.
4. Loosen friction adjustment setscrew.
5. Support the extension arm. Remove the bearing post retaining ring and lower bearing washer. Lower the extension arm from the suspension tube.
6. Retain upper bearing washer.

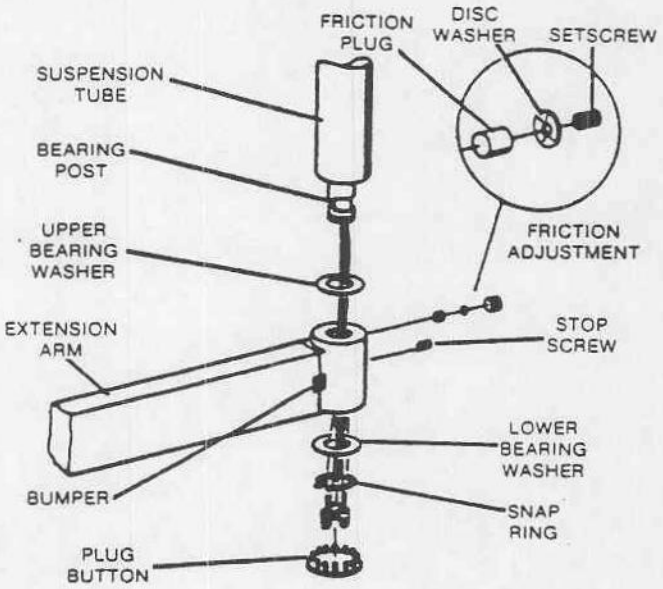


Figure 27. REMOVING EXTENSION ARM

INSTALLING EXTENSION ARM

Disconnect or turn OFF power to the light or Intensity Control to avoid hazardous electrical contact.

Use two people to lift and attach the extension arm (and lighthead) to avoid damage to the equipment.

For double lighthead models, each lighthead will be installed in the same manner. Rotation for each arm is 150°.

1. Install upper bearing washer over cord and onto bearing post.
2. Lift the extension arm and align with bearing post. Guide wires through arm and pivot opening.
3. Lift extension arm onto the bearing post. Tighten door point stopscrew into underrcut. The lighthead and arm will lower about 1/8 inch but will not drop from the bearing post.
4. Install lower bearing washer.
5. Use retaining ring pliers to insert snap ring securely into groove in bearing post. Lift up on arm to set snap ring in post groove.
6. Use a screwdriver blade to ensure that the snap ring is seated and secured in the post.

A loose or unseated retaining ring could cause the stopscrew to loosen and allow the extension arm to disengage.

7. Check rotation of extension arm. Advance stopscrew until it bottoms, then back off 1/4 turn.
8. Adjust friction setscrew. Extension arm should rotate freely without drift.
9. Push any excess cord into the hollow of the extension arm.
10. Connect like color wires.
11. Tape wire nuts.
12. Replace plug button.

MOUNTING PLATE/SUPPORT TUBE

Refer to Installation Manual 30976 for this procedure.

APPENDIX A

SALIENT CHARACTERISTICS

1. Shall be a ceiling mounted surgical light with two lightheads, suitable for use within hardwall shelters in military field medical facilities.
2. Shall be designed for use within a finished floor-to-ceiling height of 81 inches to 86 inches (205.74 to 218.44 cm).
3. Each lighthead shall be independently capable of being positioned, using articulating arms, at any point horizontally within a 4-1/2 foot (137.16 cm) radius of the ceiling mount. When installed at a ceiling height of 81 inches (205.74 cm), shall be capable of being positioned vertically at any height between approximately 43-1/2 and 73 inches (110.49 and 185.42 cm) above the finished floor. Lightheads shall be counterbalanced to hold selected positions within the above parameters.
4. Each lighthead shall be equipped with a 150 watt halogen lamp having a rated average life of at least 1000 hours, and be capable of providing 4000 footcandles of illumination at 36 inches (91.4 cm) focal length, at approximately 4800 degrees Kelvin (color-corrected). Lens area shall be 103 sq. in. and circular in shape.
5. Irradiance factor shall not exceed 5.0 microwatts per square centimeter per footcandle at 36 inches from the face of the lens.
6. Each lighthead shall have two handles, one permanently attached, and a detachable sterilizable one.
7. Shall be supplied with a wall-mountable power switch, an adjustable intensity controller, and separate on-off switches at each lighthead.
8. Input electrical power shall be as specified in the latest edition of DPSC-DEPMEDS-AT(DM).
9. Shall be installable in the hardwall shelter by one person in 10 minutes or less, after the shelter has been wired and the ceiling inserts are in place.
10. Shall be field repairable with common hand tools, with lamp replacement taking less than one minute and requiring no tools.
11. Shall be highly fungus, mildew, corrosion and salt-spray resistant. Unit shall have the manufacturer's highest quality commercially available, easily cleaned, washable finish. Finish should meet or exceed abrasion and hardness (5H pencil lead) requirements suitable for use in the field and in combat support. The finishing process, as a minimum, shall consist of cleaning, alkaline spray, rinse, zinc phosphate, rinse, corrosion-inhibitor (usually chromic acid), color coat, baking in an oven, quality controls and testing.
12. Weight shall not exceed 35 pounds (15.9 kg). When disassembled, no single piece shall exceed 20 pounds (9.1 kg) in weight.
13. Shall be provisioned in accordance with the latest edition of DPSC-DEPMEDS-AT(DM).
14. Shall meet the shock requirements for Grade A, Class I of MIL-S-901.

APPENDIX B

LIST OF SUPPLIED EQUIPMENT

PART NO.	DESCRIPTION
68811	Light Assembly, Surgical (Two Supplied)
60881	Control, Intensity
68810	Mounting Plate/Suspension Tube Package
67448	Template, Ceiling Mount
68487	Lubriplate, 3/8 Ounce
65196	Handle, Sterilizable
64190	Bag, Ziplock
24687	Packing Sheet, 2420
24686	Container, Transport
M0292	Drawing, 2420 Rough-In
30154	Instruction Package with Warranty
30155	Installation Package
30976	Installation Instruction
30839	Operators Manual
30840	Service Manual
30977	Parts Catalog
-511776	Transformer, 115/230-115V

APPENDIX C

LIST OF REQUIRED EQUIPMENT

- Three Wire Supply Line, Single Phase, Hot Neutral & Ground with separate Disconnect and Fused for 3.0 Amp. Length dependent on physical dimensions of facility.
- 3-Wire Stranded Cord — Length dependent on physical dimensions of facility.
- Outlet Box, 4" x 4" x 2-1/8" (for Intensity Control).
- Circuit Switch, DPST, 7.0 Amp. (for Intensity Control).
- Hardware for mounting outlet box, size and type to be determined by site engineer.
- Three 3/8" ceiling studs or rods, each stud or rod must support a minimum of 350 lbs.
- Hardware for mounting transformer box, 1/4" screws, length and type to be determined by site engineer.

APPENDIX D

PERIODIC MAINTENANCE ADJUSTMENTS AND PROCEDURES

Adjustments and Procedures

Perform all CHECKS and ADJUSTMENTS in Section 1 of this manual once a year or when the equipment is returned to active use after a significant period of inactivity. ALWAYS perform these Checks and Adjustments IN THE ORDER SHOWN IN THE MANUAL. Random adjustments may defeat other adjustments.

Special Equipment and Tools Required

- | | Screwdrivers:
  - Standard
  - Phillips
- | | Wrenches:
  - Open End
  - Allen - 0.050" to 5/16"
  - Adjustable
  - Socket
- | | Pliers:
  - Standard
  - Needle Nose
  - No. 4 External Snap Ring
- | | Wire Cutters and Stripper
- | | Pocket or Skill Knife
- | | Wire Terminal Crimp
- | | Light Meter
- | | White Cardboard (or other white surface for illumination tests)

APPENDIX E

STORAGE INSTRUCTIONS

Commercial Shipping — In Corrugated Carton

- INDOOR STORAGE - In Commercial corrugated carton.
- OUTDOOR STORAGE - None. DO NOT STORE OUTDOORS.
- HEIGHT - Six (6) cartons high.
- HUMIDITY - 5 to 95% Relative Humidity.
- TEMPERATURE - 50 to 100 Degrees F.
- FACILITY - No special facility.
- INSPECTION - Periodically perform a visual inspection check. Suggest once a year.

Military Shipping — In Military Box

- INDOOR STORAGE - In military box.
- OUTDOOR STORAGE - In military box and sealed containers.
- HEIGHT - Four (4) boxes high.
- HUMIDITY - No restriction.
- TEMPERATURE - -20 to 110 Degrees F.
- FACILITY - No special facility.
- INSPECTION - Periodically perform a visual inspection check. Suggest once a year.